WHAT IS CLAIMED IS:

1. A process of operating a vertical glass bead furnace, the furnace including a shaft open at the bottom, a raw material addition device, and an air-fuel burner, comprising the steps of:

firing the air-fuel burner and thereby entraining air into the furnace shaft through the open bottom of the shaft;

adding raw material into the furnace; and

an additional step selected from the group consisting of

(a) injecting oxidant into the shaft adjacent to the shaft bottom using a single lance;

(b) operating an oxy-fuel burner in the shaft adjacent to the shaft bottom;

(c) injecting oxidant into the shaft adjacent to the shaft bottom using multiple lances;

(d) injecting oxidant into the shaft using a lance incorporated into the air-fuel burner; and

(e) injecting oxidant into the shaft adjacent to the shaft bottom using an oxidant injection ring.

2. A process in accordance with Claim 1, wherein the additional step comprises injecting oxidant into the shaft adjacent to the shaft bottom using a single lance.

3. A process in accordance with Claim 2, wherein the step of injecting oxidant using a single lance comprises injecting oxidant upward along the center of the furnace.

4. A process in accordance with Claim 2, wherein the step of firing an air-fuel burner comprises firing with an equivalence ratio E, $0.7 \leq E \leq 1.0$.

5. A process in accordance with Claim 2, wherein the step of injecting oxidant using a single lance comprises injecting oxidant at a velocity between about 500 ft/s and about 800 ft/s.

6. A process in accordance with Claim 1, wherein the additional step comprises operating an oxy-fuel burner in the shaft adjacent to the shaft bottom.

7. A process in accordance with Claim 6, wherein the step of operating an oxy-fuel burner adjacent to the shaft bottom comprises operating an oxy-fuel burner with a flame stoichiometry R, with $0.5 \leq R \leq 2.0$.

8. A process in accordance with Claim 6, wherein the step of operating an oxy-fuel burner adjacent to the shaft bottom comprises operating an oxy-fuel burner directed upward along the center of the furnace.

9. A process in accordance with Claim 1, wherein the additional step comprises injecting oxidant into the shaft adjacent to the shaft bottom using multiple lances.

10. A process in accordance with Claim 9, wherein the step of injecting oxidant into the shaft adjacent to the shaft bottom using multiple lances comprises injecting oxidant at a velocity between about 1 ft/s and about 100 ft/s.

11. A process in accordance with Claim 9, wherein the step of injecting oxidant using multiple lances comprises injecting at an angle α relative to the vertical axis of the furnace, with $0° \leq \alpha \leq 80°$.

12. A process in accordance with Claim 1, wherein the additional step comprises injecting oxidant into the shaft using a lance incorporated into the air-fuel burner.

13. A process in accordance with Claim 12, wherein the step of injecting oxidant into the shaft using a lance incorporated into the air-fuel burner comprises injecting oxidant at a velocity between about 30 ft/s and about 100 ft/s.

14. A process in accordance with Claim 1, wherein the additional step comprises injecting oxidant into the shaft adjacent to the shaft bottom using an oxidant injection ring.

15. A process in accordance with Claim 14, wherein the step of injecting oxidant into the shaft adjacent to the shaft bottom using an oxidant injection ring comprises injecting oxidant at a velocity between about 30 ft/s and about 200 ft/s.

16. A process in accordance with Claim 14, wherein the furnace has an internal diameter D_F, and wherein the step of injecting using an injection ring comprises injecting using an injection ring having an external diameter D_R, and wherein $0.2 \leq D_R/D_F \leq 0.9$.

17. A vertical glass furnace comprising:

a shaft having an interior space and open at the bottom;

a raw material addition device mounted so add raw material to the interior of the shaft;

an air-fuel burner; and

an additional device selected from the group consisting of:

(a) a single oxidant injection lance adjacent to the shaft bottom useful for injecting oxidant into the shaft;

(b) an oxy-fuel burner in the shaft adjacent to the shaft bottom;

(c) multiple oxidant injection lances adjacent to the shaft bottom useful for injecting oxidant into the shaft;

(d) a lance incorporated into the air-fuel burner; and

(e) an oxidant injection ring positioned for injecting oxidant into the shaft adjacent to the shaft bottom.

18. A vertical glass furnace in accordance with Claim 17, wherein the device comprises a single oxidant injection lance adjacent to the shaft bottom useful for injecting oxidant into the shaft.

19. A vertical glass furnace in accordance with Claim 18, wherein the furnace has a center, and wherein the single lance is directed upward along the center of the furnace.

20. A vertical glass furnace in accordance with Claim 17, wherein the device comprises an oxy-fuel burner in the shaft adjacent to the shaft bottom.

21. A vertical glass furnace in accordance with Claim 20, wherein the furnace comprises a center, and wherein the oxy-fuel burner is directed upward along the center of the furnace.

22. A vertical glass furnace in accordance with Claim 17, wherein the device comprises multiple oxidant injection lances adjacent to the shaft bottom useful for injecting oxidant into the shaft.

23. A vertical glass furnace in accordance with Claim 22, wherein the furnace has a vertical axis, and wherein the multiple lances are each oriented to inject at an angle α relative to the vertical axis of the furnace, with $0° \leq \alpha \leq 80°$.

24. A vertical glass furnace in accordance with Claim 17, wherein the device comprises a lance incorporated into the air-fuel burner.

25. A vertical glass furnace in accordance with Claim 17, wherein the device comprises an oxidant injection ring positioned for injecting oxidant into the shaft adjacent to the shaft bottom.

26. A vertical glass furnace in accordance with Claim 25, wherein the furnace has an internal diameter D_F, wherein the injection ring has an external diameter D_R, and wherein $0.2 \leq D_R/D_F \leq 0.9$.